

REMARKS

Claims 1-16 are pending in this application; and in the Office Action, the Examiner issued a final rejection of all of these claims under 35 U.S.C. 103 as being unpatentable over the prior art, principally U.S. Patents 6,211,849 (Sasaki, et al.) and 6,593,918 (Taguchi, et al.).

More specifically, Claims 1 and 4 were rejected as being unpatentable over Sasaki, et al. in view of Taguchi, et al, Claim 2 was rejected as being unpatentable over Sasaki, et al, and Taguchi, et al and further in view of U.S. Patent 5,751,261 (Zavracky, et al.), and Claim 3 was rejected as being unpatentable over Sasaki, et al, and Taguchi, et al. and further in view of U.S. Patent 5,623,519 (Babcock, et al.). Claim 5 was rejected as being unpatentable over Sasaki, et al. and Taguchi, et al, and further in view of U.S. Patent 5,801,674 (Shimizu), Claims 6 and 7 were rejected as being unpatentable over Sasaki, et al. in view of Zavracky, et al. Babcock, et al and Taguchi, et al, and Claim 8 was rejected as being unpatentable over Sasaki, et al, Zavracky, et al, Babcock, et al. and Taguchi, et al in view of U.S. Patent 5,974,464 (Shin, et al.). Claim 9 was rejected as being unpatentable over Sasaki, et al, Zavracky, et al, Babcock, et al, and Taguchi, et al. in view of U.S. Patent 5,825,777 (Komarek, et al.), and Claims 10-16 were rejected as being unpatentable over Shimizu in view of Sasaki, et al, Babcock, et al, and Taguchi, et al.

Applicants request that independent Claims 1, 4, 6, 10, 12 and 14 be amended to emphasize differences between the claims and the prior art.

For the reasons discussed below, Claims 1-16, as presented herewith, patentably distinguish over the prior art and are allowable. The Examiner is, thus, respectfully requested to enter this Amendment, to reconsider and to withdraw the rejections of Claims 1-16, and to allow these claims.

The present invention relates to a liquid crystal display device. In the device of this invention, a driver interface and the individual driver ICs are connected together in series, either by a video signal line or a transmission line, and, in operation, video signal data are transmitted to the driver ICs over those lines.

Sasaki, et al, Taguchi, et al and Shimizu disclose liquid crystal display devices. There are, though, important differences between the present invention and the devices shown in these patents.

Sasaki, et al. implement a PLL or DLL into a driver LSI in order to realize a cascaded interface. Their goal is to avoid signal delay caused by the signal propagation on high-resistance wiring. An important goal of the present invention, in comparison, is to minimize the number of interface signals by employing very high-speed serial interface for video and control. By combining video data and control signal with packet communication, this invention is able to perform high-speed communication with a minimum number of wiring.

Taguchi, et al. masks video signals in the free run periods in order to suppress a disturbance of image on the panel. The preferred embodiment of this invention changes the meaning of a bit-block by changing its bit pattern with mask signal. For example, the data-bit block [0111] may be changed to the wait-bit-block [1111] in order to prevent undesirable distribution of video data among driver LSIs. One goal of the preferred embodiment of this invention is to control the packet signals, not to suppress a disturbance of the image.

Shimizu, et al. teach how to distribute video data among driver LSIs with enable wiring that are independent from video signals. One objective of the preferred embodiment of this invention is to remove the enable wiring from the interface among driver LSIs. In order to make the number of interface wiring minimum, this invention employs a very high-speed interface for

video data and control signals. With the conventional method shown in Shimizu, et al, the synchronization of high-speed video signal and the low-speed enable signal cannot be taken, since the phase shift of video signal and the enable signal is different. To solve this problem, the present invention uses a packet communication, which can be easily implemented into driver LSIs.

Applicants request that independent Claims 1, 4, 6, 10, 12 and 14 be amended to emphasize the above-discussed differences between the claims and the prior art. In particular, these claims are being amended to indicate that the driver of the present invention employs a digital packet signal that includes the input video signal.

More specifically, Claims 1, 4 and 6 are being amended to include the limitation that the driver receives a digital packet signal including the input video signal. Claim 10, which is directed to a liquid crystal controller, is being amended to indicate that the output means of the controller forms digital packet signal including the serial video signal, and that this resultant packet signal is then output to the ICs of the LCD driver. Claims 12 and 14 are directed to a video signal transmission method for transmitting a video signal to an LCD driver. Both of these claims are being amended to indicate that the video signal that is transmitted is part of a digital packet signal.

The other references of record have been reviewed and they also fail to disclose or suggest the use of digital packet signals in the manner described in Claims 1, 4, 6, 10, 12 or 14.

For instance, Zavracky, et al. discloses an aluminum interconnect, but does not teach how to realize the high speed interface of the present invention.

Babcock, et al. teach means of establishing frame and word synchronization in serial data transmission by using synchronization patterns. The preferred embodiment of this invention, however, uses the synchronization pattern in order to determine the start point in the bit stream. The present application discloses a timing lock counter (Figure 6, item 58) in order to reduce unnecessary synchronization processing.

Shin et al. teach how to connect between an LCD graphics controller and an LCD panel controller with high-speed serial interface. The present application teaches how to connect between an LCD panel controller and driver LSIs. The present application discloses a video distribution mechanism using bit-block, such as Sync, Command, Data, and Wait.

Komarek, et al. show a telephone system. A dummy circuit is controlled by the control circuits to maintain the dummy node free of displacement current as the control voltage changes. The dummy circuit shown in the present application is to maintain the delay time of data and clock signals.

Thus, the prior art fails to disclose or suggest how to control the driver LSIs with a high speed serial interface without conventional low-speed ENABLE-like signals.

The use of digital packet communication, as described in Claims 1, 4, 6, 10, 12 and 14, as amended herein, is of utility for a number of reasons. For instance, it can minimize the interface signals, and It can be easily implemented into driver LSIs, since it employs a simple synchronization mechanism without PLL or DLL.

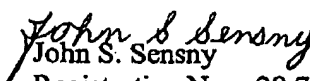
Because of the above-discussed differences between Claims 1, 4, 6, 10, 12 and 14 and the prior art, and because of the advantages associated with those differences, it cannot be said that any of these claims is obvious in view of the prior art, and accordingly these claims patentably distinguish over the prior art and are allowable. Claims 2 and 3 are dependent from Claim 1 and

are allowable therewith; Claim 5 is dependent from Claim 4 and is allowable therewith; and Claims 7-9 are dependent from, and are allowable with, Claim 6. Similarly, Claim 11 is dependent from, and is allowable with, Claim 10; Claim 13 is dependent from, and is allowable with, Claim 12; and Claims 15 and 16 are dependent from Claim 14 and are allowable therewith.

Applicants note that the amendments requested herein only emphasize differences between the claims and the prior art. For example, Claims 1, 4 and 6 already include a video signal, and the claims are being amended herein to indicate that this signal is part of a digital packet signal. In addition, the last Office Action was the first time that Taguchi, et al. was applied against the claims, and this is the first opportunity applicants have had to respond the new rejection. Accordingly, it is believed that entry of this Amendment is appropriate and such entry is respectfully requested.

For the reasons advanced above, the Examiner is asked to enter this Amendment, to reconsider and to withdraw the rejections of Claims 1-16 under 35 U.S.C. 103, and to allow these claims. If the Examiner believes that a telephone conference with Applicants' Attorneys would be advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned.

Respectfully Submitted,


John S. Sensny
Registration No.: 28,757
Attorney for Applicants

Scully, Scott, Murphy & Presser
400 Garden City Plaza
Garden City, New York 11530
(516) 742-4343

JSS:jy